NeoPhotonics

Joint Technical Paper With Inphi: Enabling Single-carrier Spectral Efficient 400Gbps Transmission

By Winston Way, Ph.D. on June 8, 2017

With a combination DP-32QAM and 45 GBaud, the system not only demonstrates a near-term path to 400 Gb/s operation, it provides a roadmap to the future.

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Bandwidth-intensive applications like streaming video, big data, and the looming Internet of Things have sent bandwidth demand skyrocketing. In response, network carriers find themselves scrambling for new technology to keep up. Suddenly, 100 Gb/s data rates are barely sufficient to satisfy the needs of today, let alone tomorrow. As long as carriers are installing new transport equipment, they are keenly interested in finding a way to satisfy demand five years out in the future, or even more. This has led to a major push toward 400 Gb/s transmission equipment for metro, regional, and long-haul optical transport systems.

Current 100 Gb/s transmission equipment leverages 32-GBaud electronics in conjunction with coherent modulation schemes like dual-polarized quadrature phase-shift keying (DP-QPSK), aka four-level quadrature amplitude modulation (4QAM). This scheme can send 4 bits per symbol, which is double the amount of previous detection technologies. Sending 4 bits at 25 Gb/s (the effective data rate of a 32 GBaud system after removal of overhead) gives 100 Gb/s operation.

Based on this model, achieving 600 Gb/s transmission at 32 GBaud would require a modulation scheme capable of transmitting six bits per symbol, or DP-64QAM. The problem is that moving to a higher-order format is extremely challenging. The signal-to-noise ratio (SNR) drops, which shortens the effective transmission distance. To address this issue, transport-equipment providers have now begun to explore a hybrid approach: the use of faster electronics to enable a significant bit-rate boost with a smaller jump in modulation scheme.

Recently, NeoPhotonics and its vendor-partner Inphi Corp. demonstrated this approach with 400 Gb/s transmission over a single wavelength using a DP-32QAM system running at 45 GBaud. To learn more about the technical details involved, read this white paper. See how the hybrid technique provides a path to compact, low-power, and economical 600 Gb/s signaling.